

Appendix 5-5: Emergent and Submerged Aquatic Vegetation Coverage in the STAs

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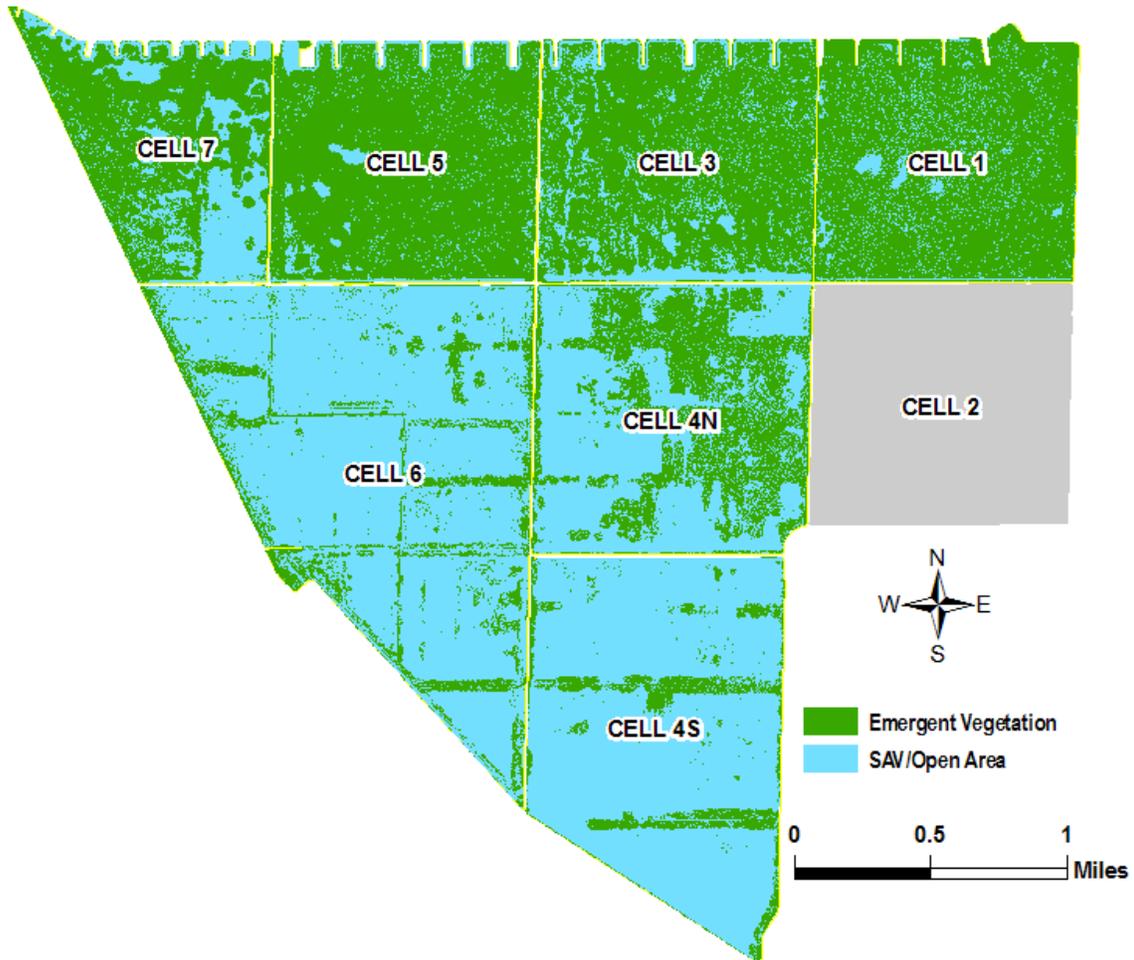
The Everglades Forever Act Stormwater Treatment Area (STA) permits require the preparation of vegetation maps and aerial imagery. While the original intent of this Long-Term Plan activity was to assess biomass phosphorus storage in a given cell, aerial surveys alone do not provide that level of information; therefore, later revisions to the Long-Term Plan included flexibility to acquire either aerial images or vegetation maps. For the past several years, the focus has been on acquiring aerial images only. The information collected is used for several purposes: (1) documentation of area coverage of emergent aquatic vegetation (EAV) versus submerged aquatic vegetation (SAV) and open area based on aerial images, (2) mapping dominant vegetation types on an as-needed basis, (3) monitoring changes in vegetation density in problematic cells, and (4) assessing hydraulic condition as influenced by presence or absence of vegetation. Ground-truthing via helicopter flights supplements the aerial imagery. Future goals include being able to relate coverage and density to STA performance, estimate phosphorus storage in biomass, and determine hydraulic effects of vegetation resistance

The 2011 digital imagery was collected in May 2011 utilizing a Vexcel UltraCamX large format digital camera mounted in a Cessna 208 Grand Caravan aircraft at an approximate altitude of 13,500 feet above ground level. Raw images were processed using Microsoft Vexcel UltraMap 1.0. Stereo imagery was captured with 60 percent overlap between adjacent frames and 40 percent overlap between adjacent flight lines. STA vegetation cover maps for Stormwater Treatment Area 1 East (STA-1E) and Stormwater Treatment Area 1 West (STA-1W), Stormwater Treatment Area 2 (STA-2) and Stormwater Treatment Area 3/4 (STA-3/4), and Stormwater Treatment Area 5 (STA-5) and Stormwater Treatment Area 6 (STA-6) were produced using unsupervised classification on the color infrared bands of this imagery. Image processing software (ERDAS Imagine 2010) was also used to reclass, filter, and aggregate the initial classification. Expert knowledge and ground-truthing of vegetation composition were employed to conduct final edits, calculate acreage, and output results cartographically using Geographic Information System (GIS) software.

Among the limitations of these imageries are (1) imagery flight is limited to once a year and occurs during the dry season, and (2) their inability to specifically discern areas covered with SAV versus open areas in a wetland environment. Since aerial imagery procedure requires clear weather with a cloudless sky, flights oftentimes occur during periods when the water levels in the STAs are receding. This is particularly problematic during drought periods, such as the 2011 imagery flight. Wetland vegetation coverage can change drastically depending on hydrologic condition. For example, some areas covered with SAV and open area may be quickly covered with EAV when the water level recedes and the condition becomes conducive to EAV growth and expansion. For the following maps and data summary, coverage is distinguished between areas covered with EAV and areas covered with SAV or open area (SAV/open area). Open areas include regions of the EAV or SAV cell that may or may not have SAV, and in some cases areas

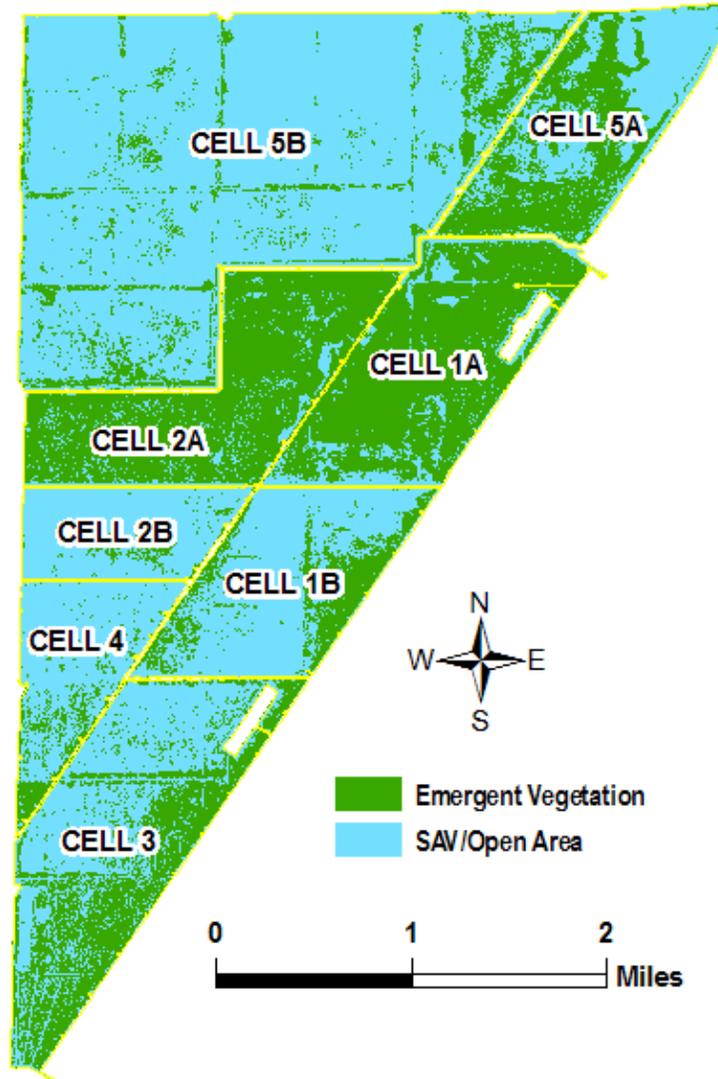
that were discerned as bare soil (often times less than 1 percent; largest was in STA-1E Cell 2 and STA-3/4 Cell 1B, with 20 and 13 percent of area, respectively) during the time of the aerial flight.

STORMWATER TREATMENT AREA 1 EAST



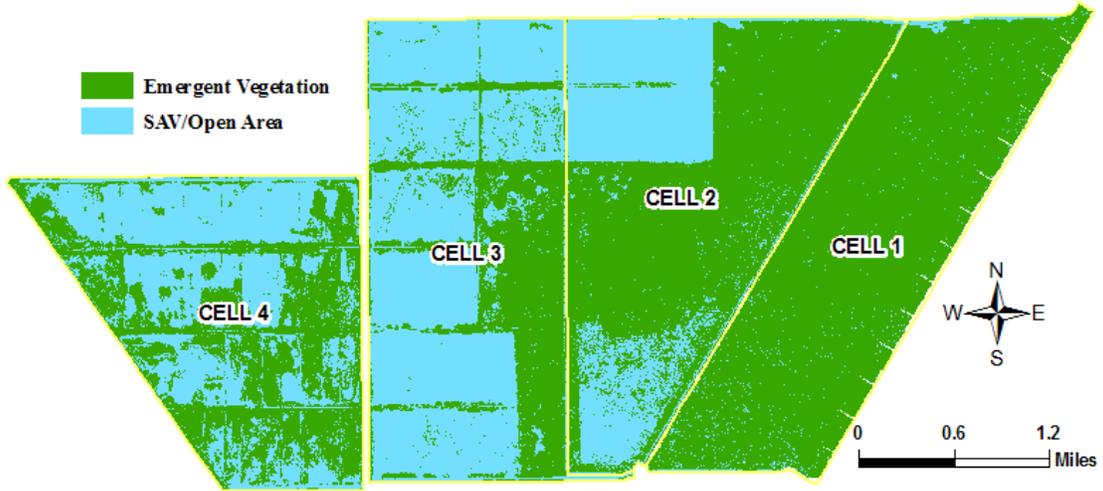
Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage	Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage
Cell 1	SAV/Open area	73	14	Cell 4S	SAV/Open area	653	89
	EAV	466	86		EAV	79	11
Cell 2	SAV/Open area	63	32	Cell 5	SAV/Open area	61	11
	EAV	369	68		EAV	482	89
Cell 3	SAV/Open area	122	21	Cell 6	SAV/Open area	884	86
	EAV	450	79		EAV	149	14
Cell 4N	SAV/Open area	377	59	Cell 7	SAV/Open area	138	35
	EAV	258	41		EAV	260	65

STORMWATER TREATMENT AREA 1 WEST



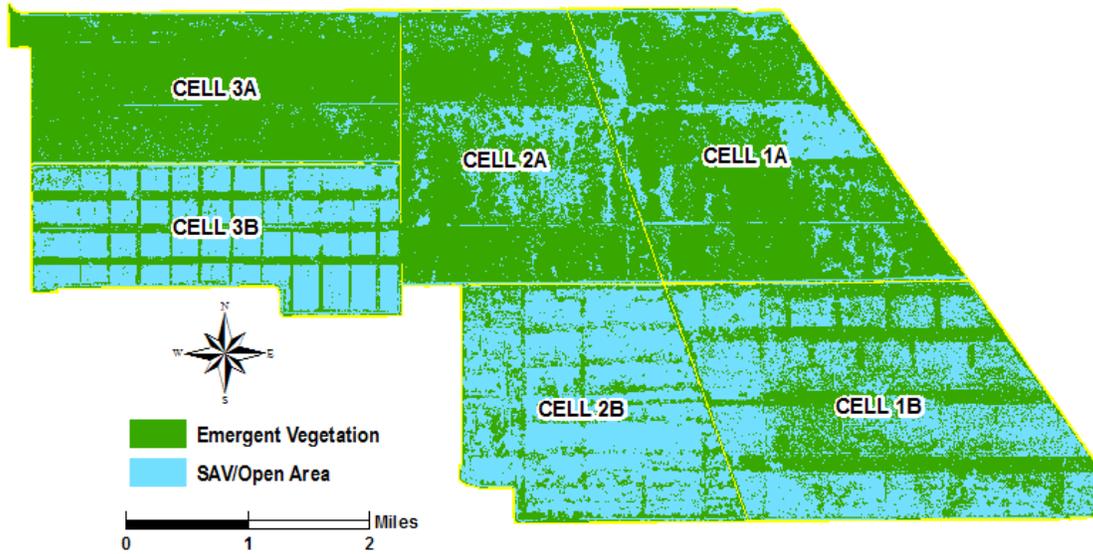
Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage	Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage
Cell 1A	SAV/Open area	126	18.0	Cell 3	SAV/Open area	494	56.1
	EAV	585	82.0		EAV	384	43.9
Cell 1B	SAV/Open area	423	73.4	Cell 4	SAV/Open area	299	83.4
	EAV	154	26.6		EAV	56	16.6
Cell 2A	SAV/Open area	93	13.3	Cell 5A	SAV/Open area	297	49.3
	EAV	600	86.7		EAV	302	50.8
Cell 2B	SAV/Open area	282	91.3	Cell 5B	SAV/Open area	2128	88.6
	EAV	26	8.7		EAV	270	11.4

STORMWATER TREATMENT AREA 2



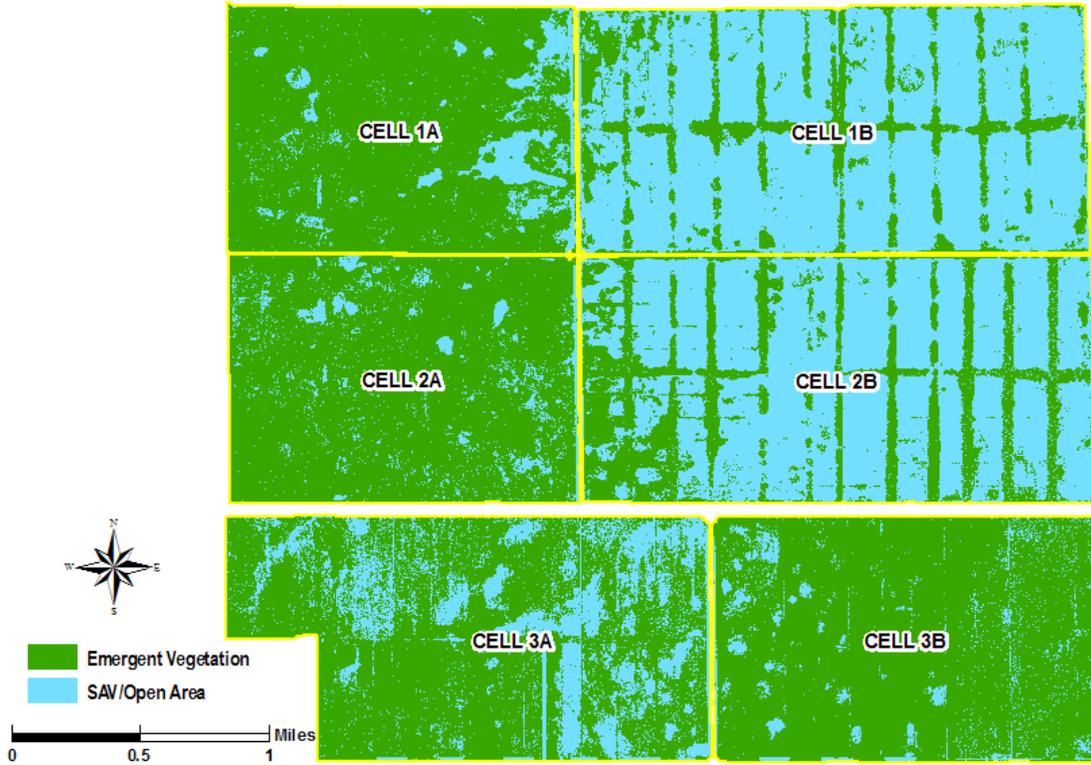
Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage
Cell 1	SAV/Open area	62	3.1
	EAV	1969	96.9
Cell 2	SAV/Open area	832	35.1
	EAV	1541	64.9
Cell 3	SAV/Open area	1574	68.6
	EAV	722	31.4
Cell 4	SAV/Open area	858	51.8
	EAV	935	48.2

STORMWATER TREATMENT AREA 3/4



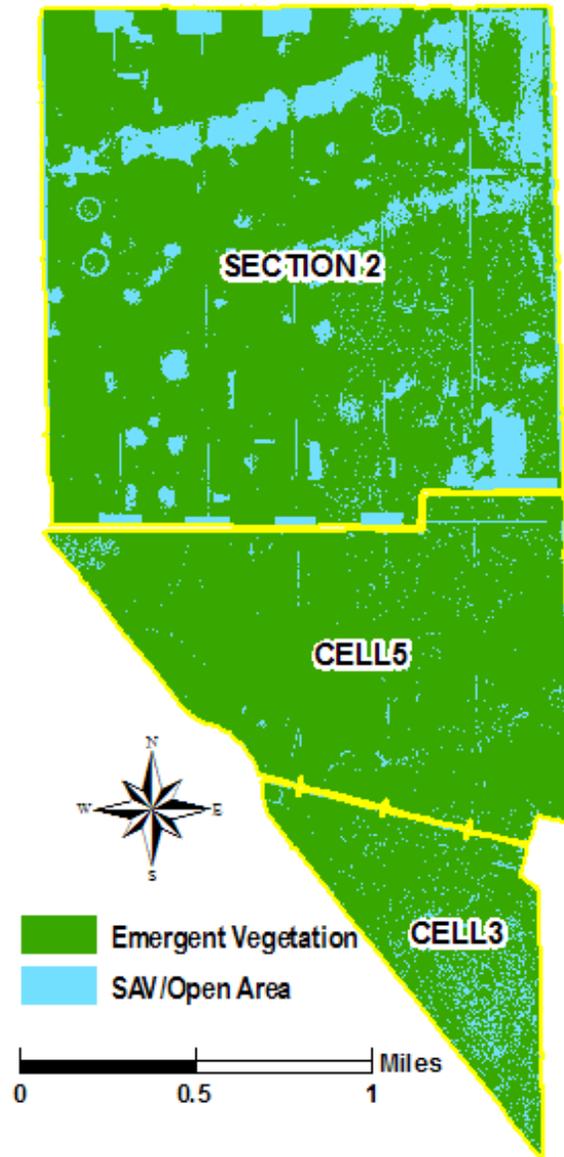
Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage
Cell 1A	SAV/Open area	617	21.2
	EAV	2380	78.8
Cell 1B	SAV/Open area	1344	52.3
	EAV	1649	47.7
Cell 2A	SAV/Open area	484	19.6
	EAV	2013	80.4
Cell 2B	SAV/Open area	1804	75.3
	EAV	592	24.7
Cell 3A	SAV/Open area	125	5.2
	EAV	2289	94.8
Cell 3B	SAV/Open area	1424	68.4
	EAV	659	31.6

STORMWATER TREATMENT AREA 5



Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage
Cell 1A	SAV/Open area	98	12.4
	EAV	736	87.6
Cell 1B	SAV/Open area	972	79.4
	EAV	252	20.6
Cell 2A	SAV/Open area	78	9.4
	EAV	765	90.6
Cell 2B	SAV/Open area	862	70.0
	EAV	370	30.0
Cell 3A	SAV/Open area	295	28.2
	EAV	752	71.8
Cell 3B	SAV/Open area	87	9.5
	EAV	833	90.5

STORMWATER TREATMENT AREA 6



Cell	Vegetation Type	Estimated Coverage (acres)	Percent Total Coverage
Section 2	SAV/Open area	267	19.9
	EAV	1091	80.1
Cell 3	SAV/Open area	34	14.0
	EAV	208	86.0
Cell 5	SAV/Open area	19	3.3
	EAV	600	96.7